UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Dive Dates: June 5-7, 2012

From:	**Rob Pedersen, Divemaster/Dep. UDO**
Thru:	**Sean Sheldrake, UDO**
To:	**Mark Filippini, Unit Manager, Environmental Services Unit, OEA** **Joyce Kelly, Director OEA**
Project:	**Quartermaster Harbor – Maury Island Aquatic Reserve**
Requested by:	**Lisa Randlette, Washington State Department of Natural Resources (WDNR), Aquatic Resources Division**
Overall Objective:	**Survey of moorage buoys systems for potential impacts to aquatic reserve habitat.**
Location:	**Quartermaster Harbor – Vashon and Maury Island, WA**

Rob Pedersen
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Date: 2012.06.18 18:35:58 -07'00'

Background:

As manager and trustee for state-owned aquatic lands WDNR has designated Quartermaster Harbor, King County as part of an aquatic reserve around Maury Island. They are currently developing a recreational mooring buoy plan for Quartermaster Harbor in response to an increase of unauthorized buoys in recent years.

WDNR requires documentation of the sea floor in two areas – Dockton and Burton Cove. They are concerned about anecdotal reports of car batteries, sunken vessels, broken creosote pilings, and similar debris in the vicinity of existing, unauthorized mooring buoys. WDNR has also evaluated 30 years' worth of Department of Fish and Wildlife herring spawn surveys that illustrate a substantial decline in eelgrass and other aquatic vegetation.

Objective:

R10 Dive Unit to perform a visual & photographic survey of moorage buoys, buoy tether and anchor systems, impacts to marine substrate, substrate type and condition and, algal/eel grass presence for ongoing WDNR regulatory enforcement and management of moorage buoys in Burton and Dockton Coves of the aquatic reserve. EPA, as a WDNR Puget Sound Initiative partner, is supporting this work as eelgrass is a keystone species to overall Puget Sound Health.

Methodology:

Figure 1 represents the approximate survey area for this dive operation. Figures 2 and 3 show the Burton and Dockton Coves, respectively. To increase productivity, divers on the *Monitor* worked one section while the *Wooldive* with the ROV worked a different area. At the guidance of WDNR and WDFW personnel, each boat's crew identified buoys targets and surveyed the buoy systems (employing WDNR's maps and latitude/longitude coordinates).

A dive buddy team descended a buoy line noting and photographing: the type of buoy tether and anchor; substrate type and condition (e.g., damage by anchor dragging); marine life (invertebrates and algae); and presence of eel grass. Divers also looked for debris on the bottom and for potentially hazardous materials (divers did not approach). The presence of invasive tunicates was also to be noted.

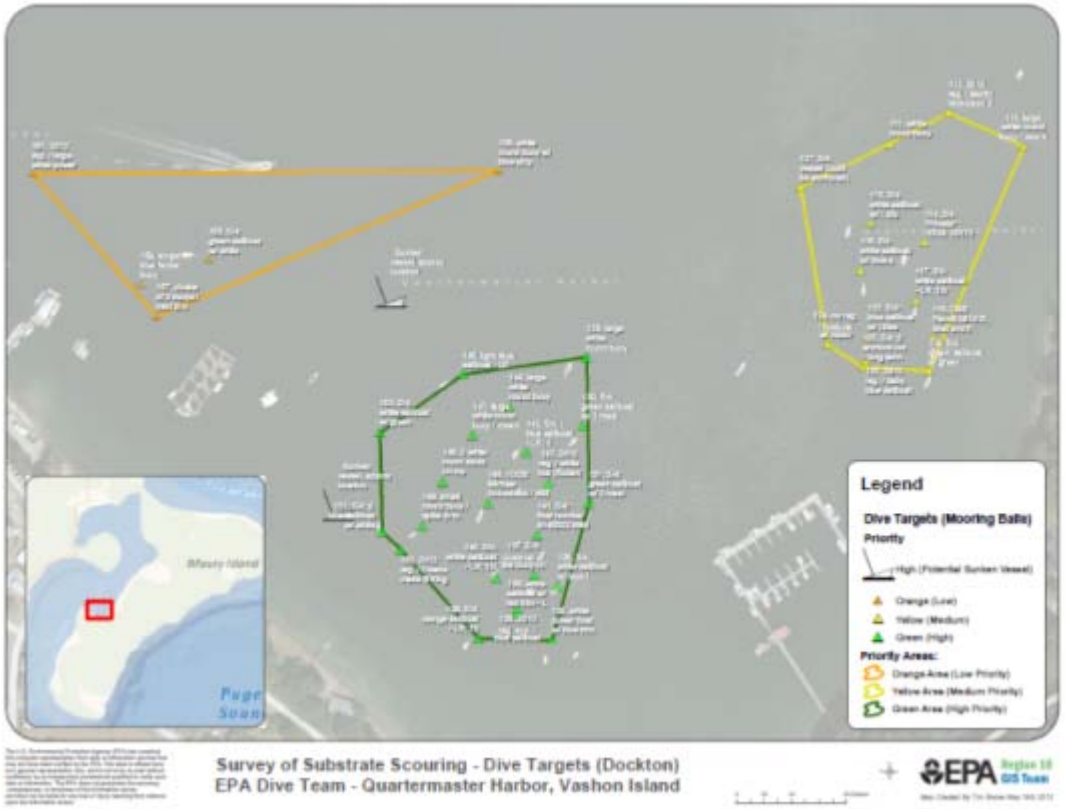
For efficiency and where practical, divers swam from buoy to buoy. To keep track of the observations, before each dive, a picture was taken of a slate with the buoy number or other descriptor written on it. Divers reported their observations from each dive to the topside crew.

The ROV was employed to collect similar observations. A "tape"/file folder was created for each location. The ROV operator narrated location information and observations onto each file. The ROV also searched for sunken, derelict vessels in the Dockton area – and documented the bottom conditions and debris under the Dockton net pen. These file folders were provided to WDNR at the completion of the project and are not a part of this dive report.

Figure 1. Overview of the work areas.

Figure 2. Burton Cove, Green = 1st priority, Orange = 2nd priority, Yellow = 3rd priority.

Figure 3. Dockton Cove.



Observations/Dive Details:

June 5, Burton Cove

Neap tide conditions and the timing of the tide with our dives, plus plankton growth created very poor to no visibility; very fine sediment also contributed to this problem. Some tube worms and old algae were noted on the buoy lines. Otherwise, visibility prevented any other marine life observations. The bottom was soft and silty.

Buddy team: SS, AB
Buoy 47 tackle
Line to chain – chain in 55 gal. concrete filled steel drum; depth 6'.

Buoy 62 tackle
All line to 55 gal. concrete filled steel drum; depth 4'

Buoy 72/73 tackle "Nadine" & "Ukelele Lady"
2 with float – line to chain to concrete block; plywood debris to the N; depth4'.

Buoy 74 tackle Boat: "Antigua" WN7602JD
Line to zero vis, could not feel anchor (submerged in sediment) ; depth 3'

Buoy 54 tackle Boat: WN9511LG; sail boat tied to float with skiff on top.
Line to zero visibility, anchor unidentified; depth 5'.

Buoy 53 Two boats tied to a float in between. WA9511LG
Line to chain – chain in 55 gal. concrete filled steel drum; depth 6'.

Buoy ? Sailboat WA3797LA
Line to [unidentified, refer to WDNR report; depth 7'
Buoy ? Sailboat WN137BA
Unidentified, refer to WNDR report; depth 7'

Buoy ? WN80023JD white sailboat with blue stripe.
Line to 55 gal. concrete filled drum; depth 4'
Buoy 51? White sailboat with yellow stripe, blue boom; N47.39283W-122.46192 #137BALine to 10' chain and concrete filled drum; depth 5'

Buddy team: RP, LM
Buoy ?
Unidentified, refer to WNDR report; depth 11'

Buoy ?
Unidentified, refer to WNDR report; depth 10'

June 6, Dockton Cove
The divers and the ROV crew worked the green/high priority area. The ROV crew also searched for sunken vessels and under the net pen.
Timing of the neap tide was better than June 5th – visibility was better (although still poor).

The bottom condition was soft mud and silt; areas closer to shore had a more sandy texture mixed in. The lack of solid objects on the bottom limited the diversity of marine life.

The following observations pertain, in general, to the area surveyed, but not indicative of every dive.
Bivalve shells on the bottom were common; clusters of mussels were often observed on buoy lines.

Cancer crabs were common and hermit crabs were also observed. Sea stars were common on and near buoy anchors; typical species notes were: *Pycnopodia helianthoides, Evasterias troschelii, Pisaster brivispinus, Pisaster ochraceus.*
Algal growth was limited to the buoys, lines, and some anchors. Very little new algal growth was seen. No eel grass was found.
On the lines, the sabellid tube worm was common (*Eudistylia vancouveri*); the attached hydroid *Haliclystus stejne* was also common.

Buddy team: TS, RP
Buoy 132 tackle "Private buoy"
Line to chain – chain in 55 gal. concrete filled steel drum; depth 4'.

Buoy 133 tackle "Ciao Bella" sailboat
Line to chain to a green colored, concrete filled drum (steel?) with large spikes protruding out of the concrete through the drum ("mine like look"); depth 7'.

Buoy 134 tackle
Line to lots of chain – chain in 55 gal. concrete filled steel drum; depth 4'.

Buoy 135 tackle Wooden boat "Connie U"
No line, all chain to an engine block; depth 4'.

Buoy 139 tackle "Mustard" sailboat WN1947RK
Line to kitchen-sized concrete filled garbage can with chain imbedded; depth 4'.

No buoy, line only on surface. Near buoy 13547.37200 122.45618
Line to 30 gal. concrete filled drum; depth 7'.

Buddy team: CS, BR
Buoy 138 tackle Buoy is a drum; Orange-red sailboat
Line to chain to steel I-beams (welded in a "Roman numeral" 5 shape); depth 6'.

Buoy 136 tackel WN490ED
Line to chain to 55 gal. concrete filled drum; 14'.

Buoy 136a (unknown) WN7521V
Line to chain to 55 gal. concrete filled drum; 15'.

Buoy 136b tackle WN2650B, wooden boat
Line to chain to concrete filled "ball"; 18'.

Buoy 131 WN856DH, Amarylis sailboat
Line to chain to concrete mooring block; 20'.

Unknown buoy near 130, no boat.
Line to chain to 55 gal. concrete filled drum; 20'.

Buoy 137 tackle
Line to buried anchor (large Danforth?); 18'.

Buoy 141 tackle PandaRand WN700DP sailboat
Line to chain to 55 gal. concrete filled green colored drum; 20'.

June 7, Dockton Cove
Completion of green/highest priority area by divers and ROV crew.
See above for description of marine life and other general observations.

Buddy team: BR, RP
Buoy 142 tackle White sailboat WN6899W with blue cover
Line to short chain to 55 gal. concrete filled drum; 27'.

Unknown, Buoy 142b tackle Red sailboat WN7866JD
Line to chain to 55 gal. concrete filled drum; 27'.

Buoy 148 tackle Black sailboat WN5548RI
Lone chain to lots of chain attached to a concrete mooring anchor; 26'.

Buoy 149 tackle Canoe, aluminum
Thin line to short chain to a tire imbedded upright and mostly exposed but "solid" (connected to something else?); 25'.

Buoy 150 tackle White sailboat WN56854NF
Line to short chain to 55 gal. concrete filled drum; 16'. Nearshore, more of a sandy bottom.

Buddy team: RR, AB
Buoy 143 tackle Light blue sailboat WN0947JF
Line to chain to 55 gal. concrete filled drum, 80% buried; 26'.

Buoy 144 tackle no boat
Short line to chain to 55 gal. concrete filled drum; 26'.

Buoy 147 tackle Tan sailboat WN9353KU
Medium thick line to thick chain to 30 gal. concrete filled drum 23'.

Buoy 146 tackle Wooden cruiser needing maintenance.
Medium thick line to thick chain to 55 gal. concrete filled drum, 50% buried; 21'.

EPA Personnel:

Divemaster:	Rob Pedersen
Tender:	Divers
Divers:	Brent Richmond, Chad Schulze, Lisa Macchio, Adam Baron, Sean Sheldrake, Rob Rau, Tim Siwiec
Boat Operator:	Doc Thompson

Hazards and Hazard Management: Entanglement in lines (fishing, mooring, other) managed by careful approach to anchor, following the mooring line and not swimming under floating docks or vessels; buddy teams staying together underwater and moving from station to station on the surface. For future work in this area at neap tides, different loading approaches will be pursued, as loading was quite difficult in the area due to lack of water at docks and extremely shallow depths.

Exposures: None except possible biological hazards in the water column; used fresh water rinse. Though no diver sickness occurred after these dives, it was noted that septic systems are failing nearby, and a shellfish bed is closed. Future work in Quartermaster Harbor or the Dockton area will require upgraded diver PPE as a preventative measure, until these situations are resolved.

Diver/Equipment/Other Issues: RP suit flood due to an open relief zipper; tank O-ring replacement ; RP's octopus exhibited slow free flow; BR's wrist computer indicated low battery; lost set screw on camera strobe arm mount to the tray.

First Aid Supplies Expended: None
Decontamination: Potable water rinse

Follow-Up Issues:

1) Tank fills and vip's – BR, RR, AB not yet completed (no tanks are back)
2) Replace camera strobe set screw – RR in process
3) Post processing on pictures and observations – RP
4) BR to replace battery in wrist computer.

A buddy team keeping track of data collection station to station.

Marine life on shallow part of mooring line.

Mooring chain on an anchor.

Concrete filled 55 gal. drum – mooring anchor.

Burton Cove – boat and float with multiple mooring anchors.

Boats and mooring floats, Dockton Cove.

Neglected boat, Dockton Cove.